

## SI-1

# AUSTRALIAN RESEARCH STRATEGIES: AGRICULTURE AND CLIMATE CHANGE

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## ABSTRACT

Australian agriculture operates within one of the most variable climates in the world and consequently Australia's farmers have developed highly resilient and adaptive production systems. This variability in the climate has always posed a risk to the nation's agricultural industries and changing climatic trends are likely to create new and additional risks.

In 2008, the Australian government identified climate change as one of its highest priorities and instigated measures to mitigate domestic emissions, to adapt to inevitable changes in the climate and to contribute to international efforts to develop solutions.

A key underpinning of the Australian research effort has been the Australian Climate Change Research Program 2004-2008, which has five research components:

- Understanding the key drivers of climate change in the Australian region
- A national climate modelling system
- Climate change, climate variability and extreme events
- Regional climate change initiatives
- International research collaboration

A major new initiative aimed at mitigating Australia's greenhouse gas emissions is the development of an emissions trading scheme. This scheme, which is called the Carbon Pollution Reduction Scheme (CPRS), is due to be introduced in 2010 but won't initially include agricultural emissions. Inclusion of agriculture will be assessed in 2013 and will likely be dependent on addressing significant hurdles in relation to measuring, monitoring and verifying the dispersed emissions that are characteristic of the sector.

Agriculture will be exposed to the CPRS through increased cost of inputs such as energy, fertiliser and transport. There may be some opportunities for the sector to provide offsets through sequestration. Research needs that have been identified in development of the climate change research strategy for primary industries include: understanding the management of emissions from agriculture (including life-cycle assessments); development of formal reporting processes; and approaches and technologies to assist individual enterprises reduce emissions, improve production efficiencies, and provide offsets.

Examples of practical mitigation at an enterprise scale might include increasing the efficiency of nitrogenous fertiliser use, reducing fuel consumption, upgrading to energy-efficient equipment and increasing feed-use efficiency in ruminant livestock.

A recent report by the Bureau of Meteorology and the Commonwealth Industrial and Scientific Research Organisation (CSIRO) indicated Australia can anticipate a warmer and drier climate in the future. Median estimates for 2030 indicate a warming of about 1°C, relative to 1990, a 3 to 5% decrease in rainfall and a 2 to 4% increase in potential evaporation. Regional variability in these climate estimates is high.

Australia's primary industries face unique challenges in this changing climate. There will be physical impacts (e.g. changing rainfall patterns), social impacts (e.g. changes to farm business structures, community demographics, health and wellbeing) and economic impacts (e.g. changing productivity levels and markets).

Australia's Farming Future is the Australian Government's climate change initiative for primary industries. The objective of Australia's Farming Future is to equip primary producers with the necessary knowledge and tools to adapt and adjust to the impacts of climate change.

To support the adaptation and adjustment to climate change within the agriculture sector, the priorities of the Australian government are to:

- increase industries' productivity and innovation,
- improve biosecurity and quarantine systems—including product integrity, and
- maintain and expanding international trade and market access.

### **KEYWORDS**

Mitigation, adaptation, productivity, biosecurity, market access,

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## Australian Research Strategies: Agriculture and Climate Change

Dr John Sims

Symposium on Global Climate Change: Imperative for agricultural research in Asia-Pacific  
Tsukuba, Japan 21-22 October 2008

Science for decision makers

DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY

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## Climate Change: 2030 (median projections – A1B)

Temperature °C: 0.8, 0.8, 1, 1.2

Rainfall %: -6, -4, -2, -1

Evaporation %: 2, 2.5, 3

[www.climatechangeinaustralia.gov.au](http://www.climatechangeinaustralia.gov.au)

[www.brs.gov.au](http://www.brs.gov.au)

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## Australian Priorities for Climate Change

Three pillars:

- reducing Australia's greenhouse gas emissions
- adapting to climate change that we cannot avoid
- helping to shape a global solution that both protects the planet and advances Australia's long-term interests.

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## Australian Priorities for Agriculture

1. Climate Change
  - Australia's Farming Future
2. Productivity and Innovation
  - National Drought Policy Review
3. Biosecurity and Quarantine
  - Biosecurity Review
4. Market Access and Trade
  - Addressing technical barriers to trade

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## Industry Emissions for Australia

Stationary energy: ~280

Transport: ~80

Fugitive emissions: ~40

Industrial processes: ~30

Agriculture: ~90

Waste: ~20

Land use, land use change and forestry: ~50 (Net)

Deforestation: ~60

Reforestation: ~10

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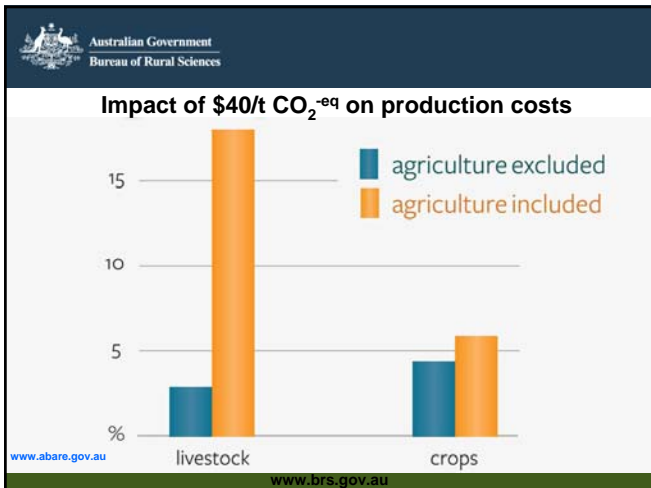
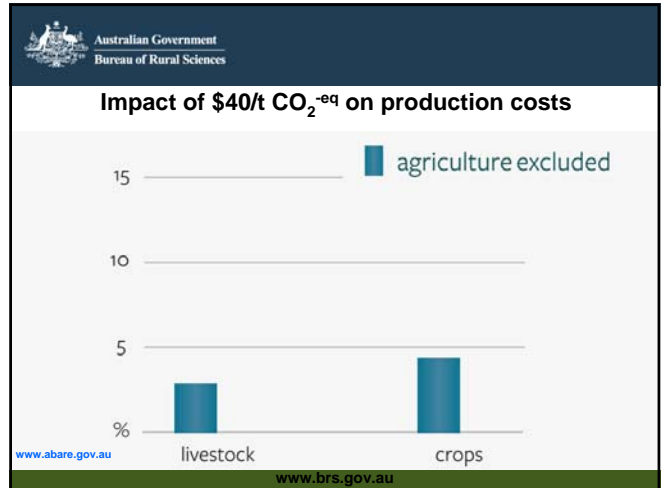
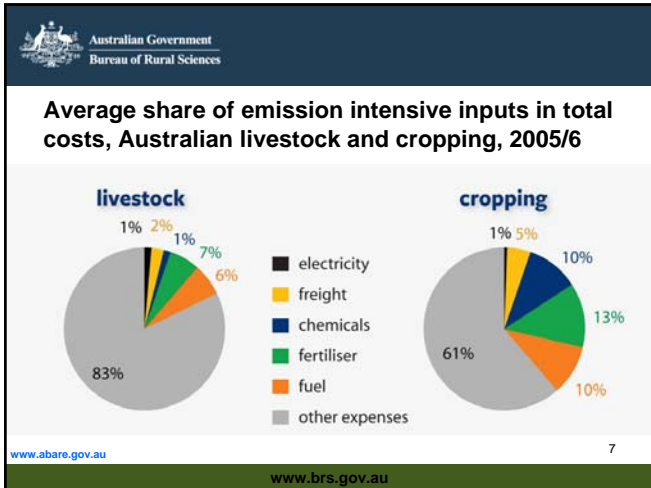
## Mitigation: Emissions Trading

Cap and trade system

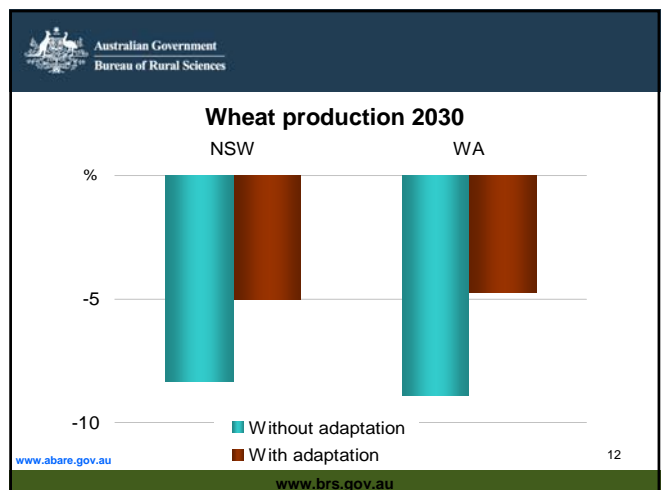
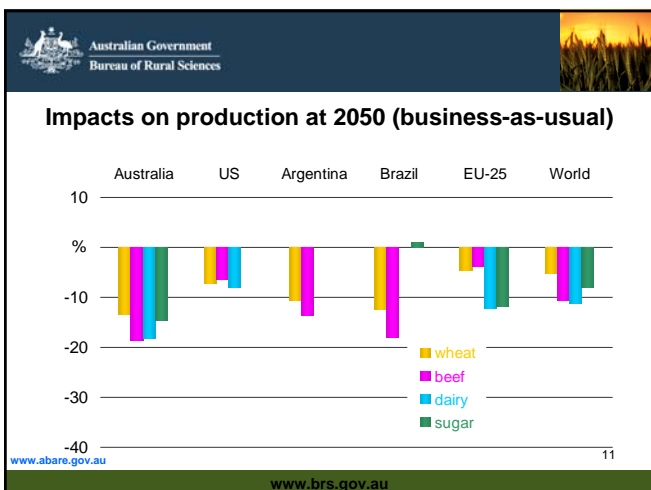
- Concentrates on the biggest polluters
  - > 25 000 tonnes per year of CO<sub>2</sub>e (~1000 companies)
- Decision on agriculture in 2013 (inclusion or exclusion)
  - ~120 000 farm businesses
  - increased cost of energy, fertiliser and transport initially

[www.climatechange.gov.au/greenpaper/](http://www.climatechange.gov.au/greenpaper/)

[www.brs.gov.au](http://www.brs.gov.au)



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- ### Research Priorities for Mitigation
- Sectoral emission profiles
    - including life cycle assessments
  - Emission measurement, monitoring, verification
    - highly dispersed emission sources
  - Abatement potential and costs
    - improved production efficiency
  - Offset potential
    - forestry and soil carbon
- www.lwa.gov.au/ccrspi 10  
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### Research Priorities for Adaptation

- Understanding future climates
  - regional projections and variability
- Preparing industries
  - production systems research
- Accessing information
  - web-based knowledge
- Facilitating change
  - social and economic drivers

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### Australia's Farming Future

- Climate change research, development and demonstration program
  - reducing greenhouse pollution
  - better soil management
  - adapting to a changing climate
- Training grants
- Adjustment grants

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### Productivity and Innovation

- National Drought Policy Review
  - Purpose (increasing frequency of events)
  - Scope (scientific, social, productivity)
  - New policies and programs 2009-10

www.daff.gov.au/agriculture-food/drought/national\_review\_of\_drought\_policy 15  
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### Broadacre Farm Incomes (1989-2007)

www.abare.gov.au 16  
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### Future Droughts in Australia

- Exceptionally warm years will occur every one to two years by 2040
- Rainfall projections are weighted towards declines
- Frequency of extreme drought will increase in southern Australia

www.bom.gov.au/climate/droughttec 17  
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### Drought Research Needs

- Improved drought monitoring capability
- Identification of preparedness needs
- Climate change projections (rural sectors, localised scale, shorter time-frames)
- Online integrated information system

www.bom.gov.au/climate/droughttec 18  
www.brs.gov.au



**Australian priorities**

- Mitigation
- Adaptation
- Global solution

**Emerging research strategies**

- Reducing emissions
- Adapting to change
- Policy reviews



**Priorities for agriculture**

- Mitigation and adaptation
- Productivity and innovation
- Biosecurity and quarantine
- Market access and trade

